## SUPPORT FOR THE AMENDMENT

This Amendment amends Claim 2. Support for the amendments is found in the specification and claims as originally filed. No new matter would be introduced by entry of these amendments.

Upon entry of these amendments, Claims 1-2 and 5-9 will be pending in this application. Claim 1 is independent.

## REQUEST FOR RECONSIDERATION

Applicants respectfully request entry of the foregoing and reexamination and reconsideration of the application, as amended, in light of the remarks that follow.

Applicants thank the Examiner for the courtesies extended to their representative during the personal interview on August 1, 2006.

The present invention provides a multilayer thin film including a ferroelectric thin film having improved properties as a result of being epitaxially grown on a primer layer of a perovskite oxide thin film that is grown on a buffer layer on a silicon substrate. See, e.g., specification at page 4, lines 13-16 and 25-30; page 5, lines 18-19.

Claims 1-2 and 5-9 are rejected under 35 U.S.C. § 103(a) over JP 11-312801 ("Noguchi") in view of U.S. Patent No. 5,674,563 ("Tarui").

The Final Rejection at page 3, section 6, lines 9-11, admits that "Noguchi et al does not teach a perovskite oxide thin film formed on the buffer layer and a ferroelectric film having a (100) and (001) orientation, which has a different composition than the perovskite oxide thin film". The Final Rejection relies upon Tarui for these features.

In particular, the Final Rejection asserts:

In a method of forming a ferroelectric thin film, note entire reference Tarui et al teaches forming PZT on a Pt substrate using a $PbTiO_3$ buffer layer to improve the flatness of the PZT ferroelectric thin film (col 17, ln 1-25 and col 5, ln 35-67). Tarui et al also teaches the ferroelectric film was a c-axis orientation film exhibiting PZT (001) and is an epitaxial film (col 16, ln 1-40). Tarui et al is silent to the orientation of the orientation of the $PbTiO_3$ layer. The $PbTiO_3$ layer inherently has an (001) orientation because by the definition of epitaxy, the epitaxial PZT (001) mimics the orientation of the substate it is formed on. Final Rejection at page 3, line 19 to page 4, line 4.

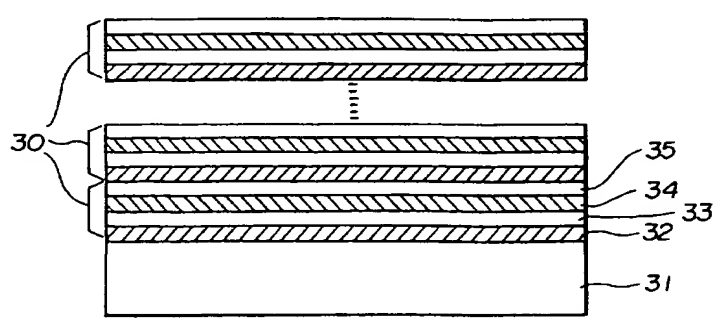
However, <u>Tarui</u> actually discloses:

Referring to FIG. 11, .... A predetermined number of PZT or PLZT layer structures are piled on the $PbTiO_3$ buffer layer structure(s) 60 in such a manner as described in connection with FIGS. 8-10. In the illustrated case, a predetermined number of PZT mono- or multi-layer structure 30 (FIG. 8) are piled on the buffer layer structures 60. The buffer layer structure(s) 60 are effective to provide a higher degree of flatness to the produced ferroelectric thin film.

FIG. 12 shows one example of X-ray diffraction pattern of the **PZT ferroelectric thin film** produced in such a manner as described in connection with **FIG. 8**. The PZT ferroelectric thin film was produced by repeating 250 source material introduction cycles and had a thickness of about 1030 Å. The ferroelectric thin film was a c-axis orientation film exhibiting **PZT(001)** and it had no diffraction pattern other than the diffraction peak from the substrate. It can be seen from its SEM image that its surface has a high degree of flatness and from its sectional image that it is an **epitaxial film**. <u>Tarui</u> at column 16, lines 5-33 (emphasis added).

<u>Tarui</u>'s PZT (001) film is formed directly on a substrate 31, as shown in FIG. 8, reproduced below.

**FIG.8**



> Referring to FIG. 8, there is shown a PZT ferroelectric thin film produced on a substrate 31 placed in an atmosphere of $O_2$ and/or $O_3$ within the reaction chamber 10. As described in connection with FIG. 2, Ti, Pb, Zr and Pb source materials are separately introduced successively in this order into the reaction chamber 10 so as to produce a layer structure 30 having a stoichiometric composition given as $Pb(Zr_xTi_{1-x})O_3$ where $0<x<1$ in one cycle of introduction of source materials. This layer structure 30 includes a Ti (or $TiO_2$) layer 32, a Pb (or PbO) layer 33, a Zr (or $ZrO_2$) layer 34 and a Pb (or PbO) layer 35 piled in this order on the substrate 31. Then this layer structure 30 is transformed into a PZT mono- or multi-layer structure by thermal energy of the heated substrate 31. The source material introduction cycle is repeated at a predetermined number of times to produce the PZT ferroelectric thin film having a predetermined number of PZT layer structures 30 piled on the substrate 31. Tarui at column 14, lines 4-20.

Because Tarui fails to suggest the formation of epitaxial PZT (001) on a $PbTiO_3$ layer on a substrate, the cited prior art fails to suggest the independent Claim 1 limitations of "a perovskite oxide thin film formed on said buffer layer, which is grown epitaxially with respect to said buffer layer, and a ferroelectric thin film having (100) and (001) orientation, which has a different composition than said perovskite oxide thin film and which is epitaxially grown on said perovskite oxide thin film". Thus, the prior art rejections should be withdrawn.

Claim 2 is rejected under 35 U.S.C. § 112, second paragraph. To obviate the rejection, "second perovskite" is replaced with --perovskite--.

In view of the foregoing amendments and remarks, Applicants respectfully submit that the application is in condition for allowance. Applicants respectfully request favorable consideration and prompt allowance of the application.

Should the Examiner believe that anything further is necessary in order to place the application in even better condition for allowance, the Examiner is invited to contact Applicants' undersigned attorney at the telephone number listed below.

Respectfully submitted,

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